

overlying part of bank 510 and the relative crystal orientation of the side of island 520 and the adjacent part of bank 510.

### In the Claims

Please replace Claims 1, 8, 9, 13, and 18 with the following amended claims.

1. (Amended) A quantum computing structure comprising:  
a first bank of a superconducting material having a first crystal orientation;  
a mesoscopic island of a superconducting material having a second crystal orientation,  
wherein at least one of the island and the bank comprises a d-wave superconducting material;  
and  
a clean Josephson junction between the island and the bank.
8. (Amended) A quantum register comprising:  
a bank of a superconducting material;  
a plurality of mesoscopic islands of superconducting material; and  
a plurality of clean Josephson junctions, each clean Josephson junction being between  
the bank and a corresponding one of the islands.
9. (Amended) The quantum register of claim 8, wherein each of the mesoscopic  
islands comprises a d-wave superconductor.
13. (Amended) The quantum register of claim 12, further comprising a second  
plurality of single electron transistors, each single electron transistor in the second plurality  
being between ground and a corresponding one of the plurality of mesoscopic islands.
18. (Amended) The quantum register of claim 17, further comprising a third plurality  
of single electron transistors, each single electron transistor in the third plurality being  
between ground and a corresponding one of the plurality of mesoscopic islands.

Please add the following new claims:

28. (New) A qubit, comprising:  
a first bank of a superconducting material having a first crystal orientation;  
a mesoscopic island having a second crystal orientation formed adjacent to the first  
bank; and  
a clean Josephson junction formed between the first bank and the mesoscopic island,  
wherein the first crystal orientation and the second crystal orientation are different.
29. (New) The qubit of Claim 28, wherein at least one of the first bank and the mesoscopic  
island is formed of a d-wave superconducting material.
30. (New) The qubit of Claim 28, further including a grounding mechanism coupled between  
the mesoscopic island and a ground.

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31. (New) The qubit of Claim 30, wherein the grounding mechanism is a single electron transistor.
32. (New) The qubit of Claim 30, wherein the grounding mechanism is a parity key.
33. (New) The qubit of Claim 28, wherein the clean Josephson junction includes a grain boundary between the island and the first bank.
34. (New) The qubit of Claim 28, wherein the clean Josephson junction includes a normal metal.
35. (New) The qubit of Claim 28, further comprising:  
a second bank of superconducting material having a third crystal orientation; and  
a Josephson junction formed between the first bank and the second bank.
36. (New) The qubit of Claim 35, further comprising:  
a coupling mechanism coupled between the mesoscopic island and the second bank.
37. (New) The qubit of Claim 36, wherein the coupling mechanism includes a single electron transistor.
38. (New) The qubit of Claim 36, wherein the coupling mechanism includes a parity key.
39. (New) A quantum register, comprising:  
a first bank of superconducting material;  
at least one mesoscopic island of a superconducting material;  
Josephson junctions formed between each of the at least one mesoscopic island and the bank.
40. (New) The quantum register of Claim 39, wherein the bank includes a d-wave superconductor.
41. (New) The quantum register of Claim 39, wherein at least one of the mesoscopic islands includes a d-wave superconductor.
42. (New) The quantum register of Claim 39, further including at least one first coupling mechanism, each of the at least one first coupling mechanisms coupling a corresponding one of the at least one mesoscopic islands to ground.
43. (New) The quantum register of Claim 42, wherein at least one of the first coupling mechanisms includes a single electron transistor.
44. (New) The quantum register of Claim 42, wherein at least one of the first coupling mechanisms includes a parity key.
45. (New) The quantum register of Claim 39, wherein at least one pair of mesoscopic islands are coupled by a second coupling mechanism.

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46. (New) The quantum register of Claim 45, wherein the second coupling mechanism includes a single electron transistor.
47. (New) The quantum register of Claim 45, wherein the second coupling mechanism includes a parity key.
48. (New) The quantum register of Claim 39, further including:  
a second bank of superconducting material; and  
a Josephson junction formed between the second bank and the first bank.
49. (New) The quantum register of Claim 48, further including at least one third coupling mechanism coupled between one of the mesoscopic islands and the second bank.
50. (New) The quantum register of Claim 49, wherein the third coupling mechanism includes a single electron transistor.
51. (New) The quantum register of Claim 49, wherein the third coupling mechanism includes a parity key.

## REMARKS

Claims 1-18 are pending in the above identified application. The Examiner has rejected Claims 1-18. Claims 12-18 have been rejected under 35 U.S.C. §112. Claims 1-18 have been rejected under 35 U.S.C. § 103. Applicants have amended Claims 1, 8, 9, 13, and 18.

### Rejections Under 35 U.S.C. § 112

#### *Rejections of Claims 12-18 under 35 U.S.C. §112, first paragraph*

Claims 12-18 have been rejected "under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention." In particular, the Examiner states that

Claim 12 shows a register with a bank and islands which are connected to each other with SETs. It is not known how such a structure would form a register and thus the device is not enabling of a register structure.

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